1888.

Abbe, Cleveland.

Treatise on meteorological apparatus and methods. Ann. Rpt. Chief Signal Officer for 1887, Pt. 2 (App. 46). Washington. 1888.

Discusses methods of measuring evaporation and of the temperature and rate of the same in connection with the hygrometric conditions of the air. Reviews work on vapor pressure and latent heat of vaporization by Ivory, Apjohn, Regnault, Glaisher, Kämtz, Wüllner, Stefan, Maxwell, Chistoni, Doyére, Angot, Sworykin, Pernter, and Ferrel. The observations by Fitzgerald and the formula derived by him are presented in detail.

Chabaneix, J. B.

Mémoire sur l'évaporation du sol. Bul. met. Hérault, 1888.

Continued from 1886 and 1887.

Greeley, A. W.

American Weather. New York. 1888. 8vo.

General discussion (p. 45–48) of the various classes of evaporometers.

Hann, J.

Beobachtungen über Verdunstung in der Kolonie New South Wales. Met. Zeits, 1888, 5:323.

Summarizes the results of observations of evaporation in New South Wales made by H. C. Russell in 1885. (See Symons, 1890.)

Müller-Erzbach, W.

Die Bestimmung der Durchschnittstemperatur durch das Gewicht von verdampfter Flüssigkeit. Met. Zeits., 1888, 5:453–9.

Determines the average temperature of the air by measuring the loss in weight through evaporation of various liquids. The results agree closely with the means of thermometer readings.

Russell, T[homas].

Depth of evaporation in the United States. Mo. weather rev., 1888, 16:235–9.

The evaporation from the Piche evaporometer was compared with that from a free water surface in a small dish, both dish and Piche being exposed in the standard louvred shelter of that date. The depth of evaporation recorded by the Piche and the average wind velocity at 19 different stations during June to September, 1888, are tabulated. Also determines the relative amounts lost by evaporation from stationary and whirling Piche for velocities of 10, 15, 20, 25, and 30 miles per hour. The rate of evaporation at Signal Service stations is then computed from the means of the tridaily readings of the wet-bulb and dew-point for the period December, 1887, to January, 1888, inclusive, using the following formula (no wind term is used because of the shelter exposure):

$$30\left(\frac{Ap_w+B(p_w-p_d)}{b}\right),$$

in which p_w=the vapor pressure for the mean monthly temperature of the wet-bulb thermometer, p_d=vapor pressure for the monthly mean dew-point, b=mean barometric pressure, A=1.96, and B=43.9. He compares these computed values with those observed at the Boston waterworks by Fitzgerald; and by means of them constructs a chart of lines of equal annual depth of evaporation at the U. S. Signal Service stations for the period July, 1887, to June, 1888.

Symons, G. J.

The Camden Square evaporation experiments. Brit. Rainf., 1888, (—):42–3.

Tables of evaporation from the large tank at Camden Square from July, 1888, to June, 1889, inclusive.

1889.

Campidoglio, R. Osservatorio del.

Osservazioni meteorologiche del R. Osservatorio del Campidoglio. Atti r. accad. Lincei, 1889, 5:(4).

The daily evaporation in millimeters and the monthly totals from January to July, 1889, show variations from 54.33 millimeters in February to 149.40 millimeters in July.

Carpenter, L. G.

Evaporation from tanks placed in the ground and also from tanks floating in the water. Colo. exp. sta. 2d Ann. Rpt., 1889, p. 49–76. Abstract in Exp. sta. rec., 1890, 2:394.

A table presents the monthly evaporation for the years 1887-9 at Fort Collins, Colo., from tanks 3 by 3 by 3 feet and also from smaller tanks to determine the influence of size and material on evaporation. The evaporation computed from the following expression differed only slightly from the observed amount: Evaporation in inches for 12 hours = $0.1984\,(T-t)(1+0.005\,w)$, in which T is the vapor pressure at the temperature of the water surface, t the vapor pressure of the air, and w the velocity of the wind in miles per 12 hours. For a whole day the formula becomes, $E=0.3868\,(T-t)(1+0.0025\,w)$. Fitzgerald's formula is quoted: E (24 hours)$=0.3934\,(T-t)(1+0.0208\,w)$. The close agreement of these coefficients, derived from investigations carried on under as different circumstances as these, strengthens confidence in either formula, and makes it probable that the true value of the coefficient is not far from 0.39 or 0.40. (See Bigelow, 1907.)

Davis, Walter G.

Ligeros apuntes sobre el clima de la República Argentina. Buenos Aires. 1889. p. 238–40.

Tables of evaporation from water in sun and shade, for the years 1886-1888, inclusive show an annual average of 2292.7 millimeters in the sun and 1169.6 millimeters in the shade. Comparative experiments on evaporation from a copper dish, a glass dish, and a Wild balance, gave in the sun 1320.7 millimeters for the first, 1088.5 millimeters for the second, and 1252.2 millimeters for the last; in the shade 648.8 millimeters for the first, and 624.1 millimeters for the last.

Demangeon, A.

Climatologie d'Épinal (Vosges). Résumé général pour 10 ans, de 1872 à 1881, des observations météorologiques faites à Épinal. Épinal. 1884. 2iéme. tirage, 1889.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Mm.	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*	*Mm.*
Rainf..	119.2	70.0	75.1	75.0	72.4	89.9	108.6	94.9	78.8	98.9	82.9	68.4	964.0
Vap. pr	4.83	5.19	5.86	6.45	7.52	10.52	12.09	11.75	9.56	7.33	5.84	4.94	7.68

This lithographed sheet, 10 by 16 inches, presents a table of monthly and annual means of all the meteorological elements, including observations with a psychrometer and a Piche evaporometer, extracted from the "Résumé général detaillé" published by the same author. The mean monthly and annual rainfall and vapor pressures at Épinal for the period 1872–81 are shown in the above table.

The evaporation is here omitted since the table gives no denomination for its figures.

[*To be continued.*]

METEOROLOGY IN THE SCHOOLS.

THE USE OF LANTERN SLIDES.

Many Weather Bureau officials are finding that more and more of their attention must be devoted to the educational calls being made upon them by the schools and the public generally. The writer knows of at least two who have already made quite a collection of lantern slides illustrating the lectures which they are frequently called upon to deliver. Probably a larger number have also made such collections. It will, therefore, be of interest to all such to read a very suggestive and instructive article by Prof. W. H. Hobbs[1] of the University of Michigan, wherein is described his method of classifying and storing lantern slides. The method used makes the course of lectures the primary base in the classification of the collection of slides. The slides are stored in unit boxes of japanned tin 3½ by 4 inches on the bottom and 3 inches deep, divided into front and rear halves by a tin partition. Each box holds sixteen slides in one half, the other half being reserved to receive the slides as they are removed from the lantern; and a box is expected to accommodate the slides illustrating a subdivision of a general topic, indicated by labels on the end of the box. Besides the slides these boxes also receive properly trimmed cards on which are entered lecture data, references to literature, etc., such as pertain to the subject of the slides in the same box; thus the lecturer has ready at hand both the illustrations and the references for the subjects on which he is lecturing.

THE WEATHER MAP AND THE SCHOOLS.

California is one of the States in the Union that takes the liveliest interst in the study and teaching and application of meteorology and climatology. Recent numbers of the Bulletin of the California Physical Geography Club bear witness to this interest and its practical expression. The number for March, 1909, contains descriptions of the courses at the San Rafael and San José high schools.

Mr. Percy E. Rowell, the instructor at the San Rafael High School, has perfected a very effective system of individual home observation and study in connection with the regular class work in the school. Each student procures a moderately accurate but cheap thermometer (price 25 cents) which he exposes "on the outside of the house toward the north." These individual thermometers are read daily and reported on, and "much interest has been aroused by the voluntary comparisons of weekly averages of temperature, and a little local pride has been stimulated in regard to places of greatest heat or least heat in winter and summer, respectively." The well equipped school observatory is in charge of a pair of pupils each week who make three observations daily, including Saturday, Sunday, and other holidays, compile the weekly record and publish a summary in a local newspaper over their own names. The whole class follow this work, keeping their records on appropriate forms and rendering duplicates to the teacher, who very properly emphasizes the fact that this routine work compels the pupil to attend to business, to *think of his work* even when he is not at school and studying. "It humanizes the science and makes it knowledge, not memory."

The San José High School also has a well equipped laboratory for physical geography. The present instructor, Miss Elizabeth McFadden, writes, "Our interest at present, in common with the general public, is in the weather. I constantly

[1] W. H. Hobbs: The use of lantern views with science lectures. The Journal of Geography, April, 1909, 7:180-6.

marvel at the universal prejudice with which the weather forecast is received. We are all keeping an accurate record of Professor McAdie's daily forecast for our valley, and ascertaining by direct observation how often he makes mistakes. We have found it very interesting *and we are all more loyal supporters of this department of the Government than before the experiment."—C. A. jr.*

WEATHER BUREAU METEOROLOGICAL CHARTS OF THE OCEANS.

In May, 1871, the U. S. Signal Service sent out its first circulars addressed to shipowners and captains, in which it was requested that regular and simultaneous (tridaily) meteorological observations be maintained on shipboard for the benefit of commerce and science. Lieut. M. F. Maury, U. S. N., had previously collected and plotted the data from a large number of ships' logs for the foundation of his work, "The Physical Geography of the Sea," and in 1876 the Secretary of the Navy ordered simultaneous meteorological observations to be made on all naval vessels, this being gradually extended to the merchant marine.

For a number of years the U. S. Hydrographic Office of the Navy Department has published pilot charts of the North Atlantic and North Pacific oceans, showing meteorological features based on data collected and prepared in part by that office and in part by the U. S. Weather Bureau; but from 1875 to 1887, inclusive, the data was furnished by the U. S. Signal Service.

In 1887 the U. S. Signal Service turned over the collection and tabulation of ocean meteorological observations to the Hydrographic Office, and that office continued, as previously, its publication of the means and normals prepared by the U. S. Signal Service, until July 29, 1904. In that year the Inter-Departmental Board, appointed by the President, recommended[1]

That all meteorological reports from vessels of war or commerce or other sailing craft, now being forwarded direct to the Hydrographic Office of the Navy, shall be forwarded direct to the Weather Bureau, and the control of ocean meteorology be transferred to the Department of Agriculture, which already has ample law for doing that work;

That the estimates for the support of the Hydrographic Office of the Navy, or any other office of the Navy, for the next and succeeding fiscal years, do not contain any provision for the making of ocean forecasts, or for the publication of meteorological data, other than such as may be needed by the Hydrographer of the Navy for use on the pilot and other charts, which data shall be furnished by and credited to the Weather Bureau.

That it is the opinion of this Board that no meteorological work need or should be done by any portion of the Navy for the purpose of publication, or for the making of forecasts or storm warnings; that all such duties, being purely civil, should devolve upon the Weather Bureau of the Department of Agriculture in accordance with the organic act creating that Bureau.

The President approved this recommendation and by executive order the collection and tabulation of all meteorological data now published on the pilot chart of the Hydrographic Office has been prepared and furnished by the U. S. Weather Bureau.

Immediately on the resumption of this work by the Weather Bureau the entire meteorological data, pressure, temperature, wind-roses, storm tracks, gale percentages, calms, percentage of fog, trade wind limits, and the average conditions of wind and weather, for the North Atlantic and North Pacific monthly charts, were brought up to January 1, 1908; and this Bureau furnished in May, 1909, the first meteorological data for a seasonal pilot chart of the South Atlantic Ocean that has ever been issued by any Government.

From 1865 to 1887 the monthly reports received from vessels distributed over the principal marine highways of the globe was only 600, while at the present time, the greater interest in this branch of ocean meteorology has increased the number to over 2,000.

We take pleasure in drawing the attention of all our readers to the following notice recently issued by the Chief of the Marine Division of the Weather Bureau, relating to a new series of meteorological charts for the Atlantic and Pacific oceans.—*C. A. jr.*

U. S. DEPARTMENT OF AGRICULTURE,
WEATHER BUREAU,
MARINE DIVISION. *Washington, D. C., May 10, 1909.*

NOTICE.

Beginning with the month of July, 1909, meteorological charts of the North Atlantic and North Pacific oceans monthly, and South Atlantic Ocean quarterly, will be issued for distribution to cooperating shipmasters and others interested in ocean meteorology. The issue will include a seasonal chart of the South Pacific Ocean, September next.

The Bureau receives reports from 2,100 observers on vessels of every nationality, and from these reports prepares daily synoptic charts of the meteorological data, being thus enabled to plot the meteorological conditions prevailing over the oceans from day to day for the purpose of tracing storm tracks, percentage of fog, prevailing direction of wind, trade wind limits, pressure, and temperature.

There will be no charge for these charts. Some of them will be mailed direct from the Central Office to observers and captains on vessels, and others will be sent to American consuls and to branch Weather Bureau stations named on the list in form 1201—Marine, for distribution to such observers and captains as may not receive a copy from this office.

The Chief of the Weather Bureau would be pleased to receive from each captain or observer, on the inclosed card, a permanent address, preferably an address in the United States, to which the charts should be mailed each month.

The American representatives at the various ports are requested to kindly inform the Bureau as to the number of charts of each ocean that should be sent them for distribution to vessels touching at their ports.

It is the desire of the Chief of the Weather Bureau to popularize the charts and make them of benefit in a meteorological sense to those using them. With that end in view, any suggestion looking to their improvement will be appreciated.

Very respectfully, HENRY L. HEISKELL,
Chief of Division.

THE CUTHBERT, GA., TORNADO.

By C. F. VON HERRMANN, Section Director. Dated Atlanta, Ga., March 24, 1909.

The storm that did so much damage at Cuthbert, Randolph County, Ga., on the evening of March 9, 1909, seems to have been a veritable tornado. However, the night was so dark, with rain and wind, and the time of its passage so short that the funnel-shaped cloud was probably not actually observed by anyone. The storm was apparently not one of a group, but an isolated phenomenon formed under unusual conditions, though the center of the main barometric depression lay north of Chicago, Ill.

On the morning of March 9 a barometric depression of considerable depth was central near St. Louis, Mo., where the 7 a. m., central time, pressure was 29.34 inches. There was a peculiar trough or prolongation of low pressure that extended down the Mississippi Valley, or rather just east of the river, to New Orleans, La., where the pressure was 29.68 inches with southeast winds and a temperature of 72°. Meridian, Miss., reported a pressure of 29.64 inches and a temperature of 68°, while Vicksburg, Miss., just across the State had 29.72 inches, with a temperature of 50°, indicating sharp contrasts in temperature on each side of the trough of low barometer. At 7 p. m. the center of the depression had moved north of Chicago, Ill.; the trough of the low still extended south to the coast of the Gulf of Mexico, but had advanced to eastern Alabama. At 7 p. m. the temperature was 70° at Thomasville, Ga., with south winds, 62° at Atlanta, Ga., with southwest winds, but the wind had already shifted to west at Mobile and Montgomery, Ala., and the weather was clear at New Orleans, La., and Vicksburg, Miss. Thus the tornado occurred at the moment the trough of low pressure passed Cuthbert, Ga., and not in the southeast quadrant of the storm.

The track was not very long. It seems to have commenced

[1] See the article "Ocean Meteorology." Monthly Weather Review, 1904, 32:327.